CLAIMS

1.   A method for evaluating an air conditioning chiller having a group of components related to efficient operation, comprising:

inputting chiller operating parameter measurement data into a computing device;

the computing device computing a value in response to a predetermined association between chiller efficiency and the input chiller operating parameter measurement data;

the computing device comparing the computed value to a predetermined value to assess chiller efficiency;

the computing device identifying a chiller component problem corresponding to the predetermined association if a comparison between the computed value and the predetermined value indicates a negative impact upon chiller efficiency; and

outputting an indication of a remedial action associated with the identified problem.

2.   The method claimed in claim 1, wherein the inputting step comprises:

a person reading instruments measuring chiller operating parameters; and

a person keying the chiller operating parameter measurement data into the computing device.

3.   The method claimed in claim 1, wherein the inputting step comprises:

a person reading instruments measuring chiller operating parameters;

a person keying the chiller operating parameter measurement data into a portable handheld device; and

the computing device receiving the chiller operating parameter measurement data via the handheld device.

4. The method claimed in claim 1, wherein the inputting step comprises:

electronic sensors measuring chiller operating parameters; and

the computing device reading the chiller operating parameter measurement

data from the electronic sensors.

5. The method claimed in claim 1, wherein the inputting step comprises:

electronic sensors measuring chiller operating parameters; and

a portable handheld device reading the chiller operating parameter

measurement data from the electronic sensors; and

the computing device receiving the chiller operating parameter measurement

data via the handheld device.

6. The method claimed in claim 1, further comprising the steps of a user using a

client computer to remotely via a computing network access a server computer

associated with the computing device, and wherein the inputting step comprises the

client computer transmitting to the server computer the chiller operating parameter

measurement data.

7. The method claimed in claim 1, further comprising the steps of a user using a

client computer to remotely via a computing network access a server computer

associated with the computing device, and wherein the outputting step comprises the

server computer transmitting to the client computer the indication of a remedial action

associated with the identified problem.

8. The method claimed in claim 7, further comprising the step of a provider of

services associated with identification of a problem and outputting of an indication of

a remedial action associated with the identified problem receiving monetary

compensation from a recipient of the services.

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9.   The method claimed in claim 7, further comprising the steps of:

the user using the client computer to log on to the server computer;

the server computer transmitting to the client computer indications of a plurality of chillers from which a user can select;

the user selecting the chiller from the indications of a plurality of chillers; and

the client computer transmitting to the server computer an indication of the selected chiller.

10.   The method claimed in claim 9, wherein the indications of a plurality of chillers includes chillers at different geographic sites from each other.

11.   The method claimed in claim 9, wherein the indications of a plurality of chillers includes chillers installed in the same building as each other.

12.   A method for evaluating monetary cost of inefficient operation of an air conditioning chiller, comprising:

inputting chiller operating parameter measurement data into a computing device;

the computing device computing a measure of inefficiency in response to the input chiller operating parameter measurement data and a predetermined association between chiller efficiency and the input chiller operating parameter measurement data;

the computing device computing a monetary energy cost corresponding to the computed measure of inefficiency; and

outputting an indication of the measure of inefficiency and the corresponding monetary energy cost.

13.   The method claimed in claim 12, wherein the inputting step comprises:

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a person reading instruments measuring chiller operating parameters; and

a person keying the chiller operating parameter measurement data into the computing device.

14.   The method claimed in claim 12, wherein the inputting step comprises:

a person reading instruments measuring chiller operating parameters;

a person keying the chiller operating parameter measurement data into a handheld device; and

the computing device receiving the chiller operating parameter measurement data via the handheld device.

15.   The method claimed in claim 12, wherein the inputting step comprises:

electronic sensors measuring chiller operating parameters; and

the computing device reading the chiller operating parameter measurement data from the electronic sensors.

16.   The method claimed in claim 12, wherein the inputting step comprises:

electronic sensors measuring chiller operating parameters; and

a handheld device reading the chiller operating parameter measurement data from the electronic sensors; and

the computing device receiving the chiller operating parameter measurement data via the handheld device.

17.   The method claimed in claim 12, further comprising the steps of a user using a client computer to remotely via a computing network access a server computer associated with the computing device, and wherein the inputting step comprises the client computer transmitting to the server computer the chiller operating parameter measurement data.

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18. The method claimed in claim 12, further comprising the steps of a user using a client computer to remotely via a computing network access a server computer associated with the computing device, and wherein the outputting step comprises the server transmitting to the client computer the indication of a remedial action associated with the identified problem.

19. The method claimed in claim 18, further comprising the step of a provider of services associated with the identification of a problem and outputting of an indication of a remedial action associated with the identified problem receiving monetary compensation from a recipient of the services.

20. The method claimed in claim 18, further comprising the steps of:

the user using the client computer to log on to the server;

the server transmitting to the client indications of a plurality of chillers from which a user can select;

the user selecting the chiller from the indications of a plurality of chillers; and

the client computer transmitting to the server computer an indication of the selected chiller.

21. The method claimed in claim 20, wherein the indications of a plurality of chillers includes chillers at different geographic sites from each other.

22. The method claimed in claim 20, wherein the indications of a plurality of chillers includes chillers installed in the same building as each other.

23. A method for evaluating an air conditioning chiller having a condenser susceptible to problems causing chiller operational inefficiency, comprising:

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inputting condenser inlet temperature into a computing device;

the computing device comparing condenser inlet temperature to a predetermined value corresponding to efficient chiller operation;

the computing device determining if condenser inlet temperature exceeds the predetermined value corresponding to efficient chiller operation;

the computing device identifying a cooling tower-related problem as a problem associated with a condenser inlet temperature exceeding the predetermined value corresponding to efficient chiller operation; and

outputting an indication to service one or more cooling tower subsystem elements in response to having identified a cooling tower-related problem.

24.   The method claimed in claim 23, wherein the step of outputting an indication to service one or more cooling tower subsystem elements comprises outputting an indication to service an element selected from the group consisting of: cooling tower and cooling tower controls.

25.   A method for evaluating an air conditioning chiller having a condenser susceptible to problems causing chiller operational inefficiency, comprising:

inputting condenser refrigerant temperature and condenser outlet temperature into a computing device;

the computing device computing a condenser approach value in response to a computed difference between condenser refrigerant temperature and condenser outlet temperature;

the computing device comparing the condenser approach value to a predetermined value corresponding to efficient chiller operation;

the computing device determining if condenser approach value exceeds the predetermined value corresponding to efficient chiller operation;

the computing device identifying excess condenser approach as a problem

associated with a condenser approach value exceeding the predetermined value corresponding to efficient chiller operation; and

outputting an indication to service one or more condenser subsystem elements in response to having identified excess condenser approach as a problem.

26.   The method claimed in claim 25, wherein the step of outputting an indication to service one or more condenser subsystem elements comprises outputting an indication to service an element selected from the group consisting of: condenser tubes, division plate, and division plate gasket.

27.   The method claimed in claim 25, wherein the step of the computing device computing a condenser approach value comprises:

inputting a running current measured at a compressor motor of the chiller;

computing a percentage load in response to the running current and a full load current;

computing the condenser approach in response to the difference between condenser refrigerant temperature and condenser outlet temperature as a fraction of the percentage load.

28.   A method for evaluating an air conditioning chiller having a condenser susceptible to problems causing chiller operational inefficiency, comprising:

inputting condenser pressure into a computing device;

the computing device comparing condenser pressure to a predetermined value corresponding to efficient chiller operation;

the computing device determining if condenser pressure exceeds the predetermined value corresponding to efficient chiller operation;

the computing device identifying non-condensables in the condenser as a problem associated with a condenser inlet temperature exceeding the predetermined

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value corresponding to efficient chiller operation; and

outputting an indication to service one or more condenser subsystem elements in response to having identified non-condensables in the condenser as the problem.

29.   A method for evaluating an air conditioning chiller having a condenser susceptible to problems causing chiller operational inefficiency, comprising:

inputting condenser inlet water pressure and condenser outlet water pressure into a computing device;

the computing device computing a condenser delta variance in response to a computed difference between condenser inlet water pressure and condenser outlet water pressure;

the computing device comparing the condenser delta variance to a predetermined value corresponding to efficient chiller operation;

the computing device determining if condenser delta variance exceeds the predetermined value corresponding to efficient chiller operation;

the computing device identifying low condenser water flow as a problem associated with a condenser delta variance exceeding the predetermined value corresponding to efficient chiller operation; and

outputting an indication to service one or more condenser subsystem elements in response to having identified low condenser water flow as the problem.

30.   The method claimed in claim 29, wherein the step of outputting an indication to service one or more condenser subsystem elements comprises outputting an indication to service an element selected from the group consisting of: condenser water strainer, condenser pump, condenser valves, and condenser controls.

31.   The method claimed in claim 29, wherein the step of the computing device computing a condenser delta variance in response to a computed difference between

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condenser inlet water pressure and condenser outlet water pressure comprises the steps of:

inputting a condenser design delta pressure; and

computing the square root of the ratio between the condenser design delta pressure and the difference between condenser inlet pressure and condenser outlet pressure.

32.   The method claimed in claim 31, wherein the step of the computing device computing a condenser delta variance further comprises:

inputting condenser inlet water temperature and condenser outlet water temperature;

computing a difference between condenser inlet water temperature and condenser outlet water temperature; and

adjusting the computed square root of the ratio between the condenser design delta pressure and the difference between condenser inlet pressure and condenser outlet pressure by multiplying by the difference between condenser inlet water temperature and condenser outlet water temperature.

33.   A method for evaluating an air conditioning chiller having an evaporator susceptible to problems causing chiller operational inefficiency, comprising:

inputting chiller water outlet temperature into a computing device;

the computing device comparing chiller water outlet temperature to a predetermined value corresponding to efficient chiller operation;

the computing device determining if chiller water outlet temperature exceeds the predetermined value corresponding to efficient chiller operation;

the computing device identifying a low evaporator setpoint as a problem associated with chiller water outlet temperature exceeding the predetermined value corresponding to efficient chiller operation; and

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outputting an indication to service the evaporator in response to having identified low evaporator setpoint as the problem.

34. A method for evaluating an air conditioning chiller having an evaporator susceptible to problems causing chiller operational inefficiency, comprising:

inputting evaporator pressure, evaporator outlet temperature, and refrigerant type into a computing device;

the computing device computing a use temperature in response to evaporator pressure and refrigerant type;

the computing device computing an evaporator approach value in response to evaporator outlet temperature and use temperature;

the computing device comparing the evaporator approach value to a predetermined value corresponding to efficient chiller operation;

the computing device determining if the evaporator approach value exceeds the predetermined value corresponding to efficient chiller operation;

the computing device identifying excess evaporator approach as a problem associated with the evaporator approach value exceeding the predetermined value corresponding to efficient chiller operation; and

outputting an indication to service one or more evaporator subsystem elements in response to having identified excess evaporator approach as the problem.

35. The method claimed in claim 34, wherein the step of outputting an indication to service one or more evaporator subsystem elements comprises outputting an indication to service an element selected from the group consisting of: refrigerant charge; evaporator tubes, division plate, and division plate gasket.

36. The method claimed in claim 34, wherein the step of the computing device computing an evaporator approach value in response to evaporator outlet temperature

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and use temperature comprises the steps of:

inputting a running current at a compressor motor of the chiller;

computing a percentage load in response to the running current and a full load current; and

computing a difference between evaporator outlet temperature and use temperature; and

computing a product of the percentage load and the difference between evaporator outlet temperature and use temperature.

37.   A method for evaluating an air conditioning chiller, comprising:

inputting into a computing device indications identifying each of a plurality of chillers;

inputting chiller operating parameter measurement data into the computing device;

a user selecting a chiller of the plurality of chillers;

the computing device computing a measure of inefficiency of the selected chiller in response to the input chiller operating parameter measurement data and a predetermined association between chiller efficiency and the input chiller operating parameter measurement data; and

outputting an indication of the measure of inefficiency.

38.   The method claimed in claim 37, wherein each of the plurality of chillers is located at a different geographic site from all other chillers of the plurality.

39.   A computer program product for evaluating an air conditioning chiller having a group of components related to efficient operation, the computer program product comprising a computer-usable data medium carrying thereon:

means for inputting chiller operating parameter measurement data into a

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computing device;

means for computing a value in response to a predetermined association between chiller efficiency and the input chiller operating parameter measurement data;

means for comparing the computed value to a predetermined value to assess chiller efficiency;

means for identifying a chiller component problem corresponding to the predetermined association if a comparison between the computed value and the predetermined value indicates a negative impact upon chiller efficiency; and

means for outputting an indication of a remedial action associated with the identified problem.

40. A computer program product for evaluating an air conditioning chiller, the computer program product comprising a computer-usable data medium carrying thereon:

means for inputting chiller operating parameter measurement data into a computing device;

means for computing a measure of inefficiency in response to the input chiller operating parameter measurement data and a predetermined association between chiller efficiency and the input chiller operating parameter measurement data;

means for computing a monetary energy cost corresponding to the computed measure of inefficiency; and

means for outputting an indication of the measure of inefficiency and the corresponding monetary energy cost.

41. A computer program product for evaluating an air conditioning chiller, the computer program product comprising a computer-usable data medium carrying thereon:

means for inputting into a computing device indications identifying each of a

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plurality of chillers;

means for inputting chiller operating parameter measurement data into the computing device;

means for selecting a chiller of the plurality of chillers;

means for computing a measure of inefficiency of the selected chiller in response to the input chiller operating parameter measurement data and a predetermined association between chiller efficiency and the input chiller operating parameter measurement data; and

means for outputting an indication of the measure of inefficiency.

42.   A system for evaluating an air conditioning chiller, comprising:

a user interface for inputting into a computing device indications identifying each of a plurality of chillers, for inputting chiller operating parameter measurement data, and for selecting a chiller of the plurality of chillers; and

a processor programmed for computing a measure of inefficiency of the selected chiller in response to the input chiller operating parameter measurement data and a predetermined association between chiller efficiency and the input chiller operating parameter measurement data and for outputting via the user interface an indication of the measure of inefficiency.

43.   The system claimed in claim 42, wherein:

the processor is included in a server computer; and

the user interface is presented on a client computer with which the server computer can communicate via a data network.

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44.   The system claimed in claim 42, wherein:

the processor is included in a personal computer; and

the user interface is included in a handheld data device with which the personal computer can communicate via a synchronization mechanism.